5. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

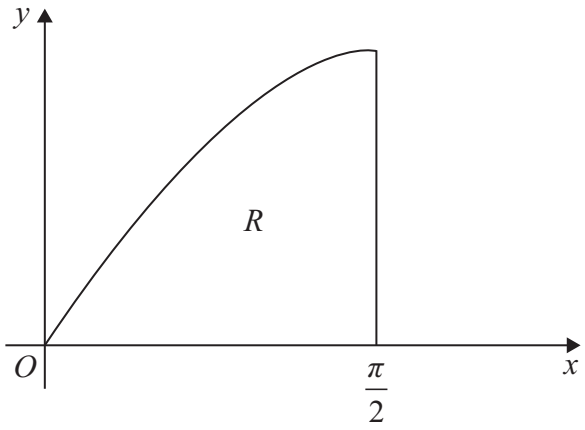


Figure 1

Figure 1 shows the finite region R which is bounded by part of the curve with equation $y = \sin x$, the x-axis and the line with equation $x = \frac{\pi}{2}$

A uniform solid S is formed by rotating R through 2π radians about the x-axis.

Using algebraic integration,

(a) show that the volume of S is $\frac{\pi^2}{4}$

(4)

(b) find, in terms of π, the x coordinate of the centre of mass of S.

(7)

(Total for Question 5 is 11 marks)